What is claimed is:

1. A method of manufacturing a green electrolyte tube comprising:

forming a composition comprising lanthanum-strontium-gallium-magnesium oxide powder and a binder into a green electrolyte tube, wherein the outer diameter of the green electrolyte tube has a tolerance of less than or equal to about ±0.3 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the green electrolyte tube has a tolerance of less than or equal to about ±0.2 millimeters over a length of greater than or equal to about 5 millimeters.

2. The method of Claim 1, wherein the forming is accomplished by extrusion.

3. The method of Claim 1, wherein the forming is accomplished by mixing the composition into a dough and extruding the dough.

4. The method of Claim 3, wherein the dough is mixed in a sigma blade mixer, a helicone, a roll mill, a Ross mixer, a dough mixer, a Waring blender, a Henschel, screw extruder, twin screw extruder, buss kneader or combinations comprising at least one of the foregoing mixing devices.

5. The method of Claim 1, further comprising sintering the green electrolyte tube to form a sintered electrolyte tube, wherein the outer diameter of the sintered electrolyte tube has a tolerance of less than or equal to about ±0.3 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the sintered electrolyte tube has a tolerance of less than or equal to about ±0.2 millimeters over a length of greater than or equal to about 5 millimeters.

6. The method of Claim 1, wherein the lanthanum-strontium-gallium-magnesium oxide powder has an average particle size of less than 1 micrometer, and is used in an amount of about 60 wt% to about 95 wt% based on the total weight of the composition.

7. The method of Claim 1, further comprising a lubricant, wherein the lubricant is polyethylene glycol and is used in an amount of 0.5 wt% to about 2.5 wt% based on the total weight of the composition.

8. The method of Claim 1, further comprising a pH control agent, wherein the pH control agent is 2-amino-2-methyl-1-propanol and is used in an amount of 0.5 wt% to about 3.5 wt% based on the total weight of the composition.

9. The method of Claim 1, further comprising a binder, wherein the binder is an acrylic based polymer or a polyether, and wherein the binder is used in an amount of 8 wt% to about 25 wt% based on the total weight of the composition.

10. The method of Claim 2, wherein the extrusion is carried out in a single screw extruder, twin screw extruder, ram extruder, buss kneader, injection molding machine, blow molding machine, vacuum forming machine and wherein the input energy during extrusion is about 1 to about 3 kilowatt-hour/kilogram.

11. The method of Claim 3, wherein the mixing is accomplished by using an energy input of about 0.5 to about 2 kilowatt-hour/kilogram.

12. The method of Claim 3, further comprising applying a vacuum of about 5 to about 700 millimeters of mercury during the mixing.

13. The method of Claim 1, wherein the outer diameter of the green electrolyte tube has a tolerance of less than or equal to about ±0.2 millimeters over a tube length of greater than or equal to about 5 millimeters, and the wall thickness of the green electrolyte tube has a tolerance of less than or equal to about ±0.15 millimeters over a length of greater than or equal to about 5 millimeters.

14. The method of Claim 1, further comprising drying the green electrolyte tube in air, or moving air prior to sintering.

15. The method of Claim 14, wherein the drying is accomplished in a tube holder having two blocks disposed upon one another, wherein each block has a semi-cylinder cut out of it and further wherein an inner diameter formed when the two blocks are disposed upon each other is greater than or equal to an outer diameter of the green electrolyte tube.

16. The method of Claim 5, wherein the sintering of the green electrolyte tube is accomplished in a V-shaped sample holder, a semi-cylindrical sample holder, a semi-elliptical sample holder or combinations comprising at least one of the foregoing sample holders and wherein each green electrolyte tube is disposed between two tubes.

17. The method of Claim 5, wherein the green electrolyte tube is sintered for about 4 to about 8 hours at a temperature of about 1350 to about 1600°C.

18. A solid oxide device comprising the green extruded electrolyte tube manufactured by the method of Claim 1.

19. A solid oxide device comprising the sintered electrolyte tube manufactured by the method of Claim 5.

20. A method of manufacturing a solid oxide fuel cell comprising:

extruding a composition comprising lanthanum-strontium-gallium-magnesium oxide powder, a binder, a lubricant, a solvent and a pH control agent into a green electrolyte tube;

sintering the green electrolyte tube to form a sintered electrolyte tube, wherein the outer diameter of the sintered electrolyte tube has a tolerance of less than or equal to about ±0.3 millimeter over a tube length of greater than or equal to about 5 millimeters, and wall thickness of the sintered electrolyte tube has a tolerance of less than or equal to about ±0.2 millimeter over a tube length of greater than or equal to about 5 millimeters; and

disposing upon the sintered electrolyte tube an anode and a cathode.

21. The method of Claim 20, wherein the lanthanum-strontium-gallium-magnesium oxide powder has an average particle size of less than 1 micrometer, and is used in an amount of about 60 wt% to about 95 wt% based on the total weight of the composition.

22. The method of Claim 20, wherein the lubricant is polyethylene glycol and is used in an amount of 0.5 wt% to about 2.5 wt% based on the total weight of the composition and wherein the pH control agent is 2-amino-2-methyl-1-propanol and is used in an amount of 0.5 wt% to about 3.5 wt% based on the total weight of the composition.

23. The method of Claim 20, wherein the extrusion is carried out in a single screw extruder, twin screw extruder, ram extruder, buss kneader, injection molding machine, blow molding machine, vacuum forming machine, and wherein the input energy during extrusion is about 1 to about 3 kilowatt-hour/kilogram.

24. The method of Claim 20, further comprising mixing the lanthanum-strontium-gallium-magnesium oxide powder, a binder, a lubricant and a pH control agent in a mixer under a vacuum of about 5 to about 700 millimeters of mercury prior to extrusion wherein the energy input during mixing is about 0.5 to about 2 kilowatt-hour/kilogram.

25. The method of Claim 20, wherein the extruded tube has a variation in outer diameter of about 2 millimeters to about 10 millimeter and a variation in wall thickness of about 0.1 millimeters to about 1 millimeter.

26. The method of Claim 20, further comprising drying the green electrolyte tube in air, or moving air prior to sintering.

27. The method of Claim 20, wherein the green electrolyte tube is sintered for about 4 to about 8 hours at a temperature of about 1350 to about 1600°C.

28. The method of Claim 20, further comprising drying the green electrolyte tube, wherein the drying is accomplished in a tube holder having two blocks disposed upon one another, wherein each block has a semi-cylinder cut out of it and further wherein an inner diameter formed when the two blocks are disposed upon each other is greater than or equal to an outer diameter of the green electrolyte tube.

29. The method of Claim 20, wherein the sintering of the green electrolyte tube is accomplished in a V-shaped sample holder, a semi-cylindrical sample holder, a semi-elliptical sample holder or combinations comprising at least one of the foregoing sample holders and wherein each green electrolyte tube is disposed between two tubes.

30. The method of Claim 20, wherein the anode is derived from nickel oxide, cobalt oxide, nickel oxide with yttrium stabilized zirconia, nickel oxide with samarium doped ceria or combinations comprising at least one of the foregoing oxides and has a thickness of about 10 to about 30 micrometers.

31. The method of Claim 20, wherein the cathode is derived from lanthanum-strontium cobalt, samarium-strontium-cobalt, samarium-strontium-cobalt oxide or combinations comprising at least one of the foregoing ceramic powders and has a thickness of about 20 to about 30 micrometers.

32. The method of Claim 20, further comprising disposing an interlayer on the sintered electrolyte tube, wherein the interlayer is derived from samarium doped ceria and has a thickness of about 10 to about 15 micrometers.

33. The method of Claim 20, wherein the solid oxide fuel cell has a maximum power density of greater than or equal to about 450 milliwatt/square centimeter at a wall thickness of less than or equal to about 0.3 millimeter, when subjected to an open circuit voltage of 1.2 volts.

34. A solid oxide fuel cell manufactured by the method of Claim 20.